

Amendments to the Claims

This listing of claims replaces all prior versions and listings of claims in the application.

Listing of Claims

1. (Currently Amended) A mobile computer comprising:
 - a camera portion;
 - an image receiving portion;
 - an operation switch; and
 - a display device,wherein the display device comprises:
 - a pixel matrix circuit including at least source lines and gate lines;
 - a driver circuit including at least a source line driver circuit for driving the source lines and a gate line driver circuit for driving the gate lines; and
 - a logic circuit for processing a signal required for driving the driver circuit and a signal including image information transmitted to the pixel matrix circuit,wherein the pixel matrix circuit, the driver circuit and the logic circuit are disposed over the same substrate,
 - wherein the pixel matrix circuit, the driver circuit, and the logic circuit are constituted by a plurality of thin film transistors, each having an active layer comprising crystalline silicon,
 - wherein the active layer of each of the plurality of thin film transistors comprises a plurality of rod-shaped crystals extending in one direction,
 - wherein a thickness of a first gate insulating film of one of the plurality of thin film transistors which is required to drive a circuit at 0.1 GHz or higher is 500 Å or thinner, and a thickness of a second gate insulating film of one of the plurality of thin film transistors which is driven by an operation voltage of 10V or greater is 1000 Å or thicker, and
 - wherein the logic circuit includes at least one selected from the group consisting of a phase comparator, a low pass filter, a voltage controlled oscillator, a frequency divider, a

horizontal scanning oscillator, a vertical scanning oscillator, a D/A converter, an I/O port, a differential amplifier, an operational amplifier, a comparator and a memory.

2. (Previously Presented) The mobile computer according to claim 1, wherein crystal lattices of the plurality of rod-shaped crystals are continuous within each of the active layer so that there is no barrier for carriers within each of the active layer.

3. (Previously Presented) The mobile computer according to claim 1, wherein the display device is a liquid crystal display.

4. (Previously Presented) The mobile computer according to claim 1, wherein each of the plurality of rod-shaped crystals has a flattened shape.

5. (Previously Presented) The mobile computer according to claim 1, wherein the active layer has an anisotropy between a channel length direction and a channel width direction thereof.

6. (Previously Presented) The mobile computer according to claim 1, wherein the active layer includes an intrinsic or substantially intrinsic channel forming region.

7. (Previously Presented) The mobile computer according to claim 1, wherein the active layer contains an element selected from the group consisting of Ni, Fe, Co, Sn, Pd, Pb, Pt, Cu and Au at a concentration 1×10^{17} atoms/cm³ or lower, the element being capable of promoting crystallization of silicon.

8. (Previously Presented) The mobile computer according to claim 1, wherein the active layer contains an element selected from the group consisting of Cl, F, and Br at a concentration from 1×10^{15} to 1×10^{20} atoms/cm³.

9. (Previously Presented) The mobile computer according to claim 8, wherein the element is concentrated at a portion close to a gate insulating film.

10. (Previously Presented) The mobile computer according to claim 1, wherein the pixel matrix circuit has a plurality of pixels, and each of the plurality of pixels is provided with at least two of the plurality of thin film transistors connected in series.

11. (Previously Presented) The mobile computer according to claim 1, wherein the pixel matrix circuit has a plurality of pixels, each of which is provided with a storage capacitor formed between a connect wiring and a black mask.

12. (Previously Presented) The mobile computer according to claim 11, further comprising an organic film having an opening wherein the black mask is formed on the organic film and the storage capacitor is formed within the opening.

13. (Previously Presented) The mobile computer according to claim 11, wherein the connect wiring comprises the same material as a source electrode of each of the plurality of thin film transistors, and the connect wiring is formed from a the same layer as the source electrode.

14. (Previously Presented) The mobile computer according to claim 1, wherein one of the plurality of thin film transistors constituting the pixel matrix circuit has a different dimension from one of the plurality of thin film transistors constituting at least one of the driver circuit and the logic circuit.

15. (Canceled)

16. (Currently Amended) A mobile computer comprising:

a camera portion;

an image receiving portion;

an operation switch; and

a display device,

wherein the display device comprises:

a pixel circuit;
a driver circuit for driving the pixel circuit; and
a logic circuit for processing a signal required for driving the driver circuit;
wherein the pixel circuit, the driver circuit and the logic circuit are formed over the same substrate and constituted with a plurality of N-channel type thin film transistors and a plurality of P-channel type thin film transistors,

wherein subthreshold coefficients of the plurality of N-channel thin film transistors and the plurality of P-channel thin film transistors are within a range of 60 to 100 mV/decade,

wherein a thickness of a first gate insulating film of one of the plurality of N-channel type thin film transistors which is required to drive a circuit at 0.1 GHz or higher is 500 Å or thinner, and a thickness of a second gate insulating film of one of the plurality of N-channel type thin film transistors which is driven by an operation voltage of 10V or greater is 1000 Å or thicker, and

wherein the logic circuit includes at least one selected from the group consisting of a phase comparator, a low pass filter, a voltage controlled oscillator, a frequency divider, an oscillator for a source line driver and an oscillator for a gate line driver.

17. (Previously Presented) The mobile computer according to claim 16, wherein the pixel circuit has a plurality of pixels arrayed in rows and columns.

18. (Currently Amended) A mobile computer comprising:

a camera portion;
an image receiving portion;
an operation switch; and
a display device,

wherein the display device comprises:

a pixel matrix circuit including at least source lines and gate lines;
a driver circuit including at least a source line driver circuit for driving the source lines and a gate line driver circuit for driving the gate lines; and

a logic circuit for processing a signal required for driving the driver circuit and a signal including image information transmitted to the pixel matrix circuit,

wherein the pixel matrix circuit, the driver circuit and the logic circuit are disposed over a the same substrate,

wherein the pixel matrix circuit, the driver circuit, and the logic circuit are constituted by a plurality of thin film transistors, each having an active layer comprising crystalline silicon,

wherein dimensions of the plurality of thin film transistors are made different depending upon required electrical characteristics,

wherein a thickness of a first gate insulating film of one of the plurality of thin film transistors which is required to drive a circuit at 0.1 GHz or higher is 500 Å or thinner, and a thickness of a second gate insulating film of one of the plurality of thin film transistors which is driven by an operation voltage of 10V or greater is 1000 Å or thicker, and

wherein the logic circuit includes at least one selected from the group consisting of a phase comparator, a low pass filter, a voltage controlled oscillator, a frequency divider, an oscillator for the source line driver circuit and an oscillator for the gate line driver circuit.

19. (Previously Presented) The mobile computer according to claim 18, wherein the dimensions include at least one of a channel length and a thickness of a gate insulating film.

20. (Previously Presented) A semiconductor device comprising:

a pixel matrix circuit including at least source lines and gate lines;

a driver circuit including at least a source line driver circuit for driving the source lines and a gate line driver circuit for driving the gate lines; and

a logic circuit for processing a signal required for driving the driver circuit and a signal including image information transmitted to the pixel matrix circuit,

wherein the pixel matrix circuit, the driver circuit and the logic circuit are disposed over the same substrate,

wherein the pixel matrix circuit, the driver circuit, and the logic circuit are constituted by a plurality of thin film transistors, each having an active layer comprising crystalline silicon,

wherein a thickness of a first gate insulating film of one of the plurality of thin film transistors which is required to drive a circuit at 0.1 GHz or higher is 500 Å or thinner, and a thickness of a second gate insulating film of one of the plurality of thin film transistors which is driven by an operation voltage of 10V or greater is 1000 Å or thicker, and

wherein the logic circuit includes at least one selected from the group consisting of a phase comparator, a low pass filter, a voltage controlled oscillator, a frequency divider, an oscillator for the source line driver circuit and an oscillator for the gate line driver circuit.

21. (Currently Amended) A mobile computer comprising:

a camera portion;

an image receiving portion;

an operation switch; and

a display device,

wherein the display device comprises:

a pixel matrix circuit including at least source lines and gate lines;

a driver circuit including at least a source line driver circuit for driving the source lines and a gate line driver circuit for driving the gate lines; and

a logic circuit for processing a signal required for driving the driver circuit and a signal including image information transmitted to the pixel matrix circuit,

wherein the pixel matrix circuit, the driver circuit and the logic circuit are disposed over the same substrate,

wherein the pixel matrix circuit, the driver circuit, and the logic circuit are constituted by a plurality of thin film transistors each comprising a crystalline silicon thin film,

wherein a plurality of circuits constituting the pixel matrix circuit, the driver circuit and the logic circuit include at least two kinds of circuits which are different from each other in at least one of a driving frequency and an operating voltage,

wherein a thickness of a first gate insulating film of one of the plurality of thin film transistors which is required to drive a circuit at 0.1 GHz or higher is 500 Å or thinner, and a

thickness of a second gate insulating film of one of the plurality of thin film transistors which is driven by an operation voltage of 10V or greater is 1000 Å or thicker, and

wherein the logic circuit includes at least one selected from the group consisting of a phase comparator, a low pass filter, a voltage controlled oscillator, a frequency divider, an oscillator for the source line driver circuit and an oscillator for the gate line driver circuit.

22. (Previously Presented) The mobile computer according to claim 1, wherein the display device is an EL display.

23. (Previously Presented) The mobile computer according to claim 16, wherein the display device is an EL display.

24. (Previously Presented) The mobile computer according to claim 18, wherein the display device is an EL display.

25. (Previously Presented) The semiconductor device according to claim 20, wherein the semiconductor device is an EL display.

26. (Previously Presented) The mobile computer according to claim 21, wherein the display device is an EL display.

27. (Currently Amended) A mobile computer comprising:

a camera portion;

an image receiving portion;

an operation switch; and

a display device,

wherein the display device comprises:

a pixel circuit;

a driver circuit for driving the pixel circuit; and

a logic circuit for processing a signal required for driving the driver circuit;
wherein the pixel circuit, the driver circuit and the logic circuit are formed over the same substrate and constituted with a plurality of N-channel type thin film transistors and a plurality of P-channel type thin film transistors,

wherein a thickness of a first gate insulating film of one of the plurality of N-channel type thin film transistors which is required to drive a circuit at 0.1 GHz or higher is 500 Å or thinner, and a thickness of a second gate insulating film of one of the plurality of N-channel type thin film transistors which is driven by an operation voltage of 10V or greater is 1000 Å or thicker,

wherein subthreshold coefficients of the plurality of N-channel thin film transistors and the plurality of P-channel thin film transistors are within a range of 60 to 100 mV/decade, and

wherein the logic circuit includes a phase comparator, a low pass filter, a voltage controlled oscillator, a frequency divider, an oscillator for a source line driver and an oscillator for a gate line driver.

28. (Previously Presented) The mobile computer according to claim 27, wherein the pixel circuit has a plurality of pixels arrayed in rows and columns.

29. (Previously Presented) The mobile computer according to claim 27, wherein the display device is an EL display.

30. (Currently Amended) A mobile computer comprising:

a camera portion;

an image receiving portion;

an operation switch; and

a display device,

wherein the display device comprises:

a pixel matrix circuit including at least source lines and gate lines;

a driver circuit including at least a source line driver circuit for driving the source lines and a gate line driver circuit for driving the gate lines; and

a logic circuit for processing a signal required for driving the driver circuit and a signal including image information transmitted to the pixel matrix circuit,

wherein the pixel matrix circuit, the driver circuit and the logic circuit are disposed over the same substrate,

wherein the pixel matrix circuit, the driver circuit, and the logic circuit are constituted by a plurality of thin film transistors, each having an active layer comprising crystalline silicon,

wherein dimensions of the plurality of thin film transistors are made different depending upon required electrical characteristics,

wherein a thickness of a first gate insulating film of one of the plurality of thin film transistors which is required to drive a circuit at 0.1 GHz or higher is 500 Å or thinner, and a thickness of a second gate insulating film of one of the plurality of thin film transistors which is driven by an operation voltage of 10V or greater is 1000 Å or thicker, and

wherein the logic circuit includes a phase comparator, a low pass filter, a voltage controlled oscillator, a frequency divider, an oscillator for the source line driver circuit and an oscillator for the gate line driver circuit.

31. (Previously Presented) The mobile computer according to claim 30, wherein the dimensions include at least one of a channel length and a thickness of a gate insulating film.

32. (Previously Presented) The mobile computer according to claim 30, wherein the display device is an EL display.

33. (Previously Presented) A semiconductor device comprising:
a pixel matrix circuit including at least source lines and gate lines;
a driver circuit including at least a source line driver circuit for driving the source lines and a gate line driver circuit for driving the gate lines; and

a logic circuit for processing a signal required for driving the driver circuit and a signal including image information transmitted to the pixel matrix circuit,

wherein the pixel matrix circuit, the driver circuit and the logic circuit are disposed over the same substrate,

wherein the pixel matrix circuit, the driver circuit, and the logic circuit are constituted by a plurality of thin film transistors, each having an active layer comprising crystalline silicon,

wherein a thickness of a first gate insulating film of one of the plurality of thin film transistors which is required to drive a circuit at 0.1 GHz or higher is 500 Å or thinner, and a thickness of a second gate insulating film of one of the plurality of thin film transistors which is driven by an operation voltage of 10V or greater is 1000 Å or thicker, and

wherein the logic circuit includes a phase comparator, a low pass filter, a voltage controlled oscillator, a frequency divider, an oscillator for a the source line driver circuit and an oscillator for the gate line driver circuit.

34. (Previously Presented) The semiconductor device according to claim 33, wherein the semiconductor device is an EL display.